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EXAMINER	
LEUNG, JENNIFER A	

ART UNIT	PAPER NUMBER
1764	

DATE MAILED: 04/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/044,526	HERMANN ET AL.	
	Examiner	Art Unit	
	Jennifer A. Leung	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 February 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8 and 10-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8 and 10-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 11, 2005 has been entered.

Response to Amendment

2. Applicant's amendment submitted on January 12, 2005 has been received and carefully considered. Claims 9 and 20-31 are cancelled. Claims 1-8 and 10-19 remain active.

Claim Objections

3. Claim 1 is objected to because "fuel shell" (line 2) should be changed to --fuel cell--, to correct for a typographical error. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-8 and 10-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1, it is unclear as to the relationship between "a catalyst" in line 7 and "a catalytic coating" in line 6. Similarly, it is unclear as to the relationship of "a catalyst coating" in

line 10 to "a catalyst" in line 7 and "a catalytic coating" in line 6. (Are the catalysts the same?).

Regarding claim 2, it is unclear as to where the limitation of, "*at least one of the structural elements* comprises a four sided element..." and the placement of an inlet and an outlet on the first and second sides of the structural element (see lines 2-5) is located in the specification and drawings. It is noted that the specification (page 8, lines 13-21) describes the four sided element and placement of the inlet and outlet in terms of the "burner element", and not the "at least one of the structural elements" as instantly claimed.

Regarding claim 3, it is unclear as to the relationship between "a fuel gas" in lines 3-4 and the fuel gas of "a fuel gas/oxygen mixture" set forth in claim 1, line 7.

Regarding claim 10, it is unclear as to whether applicant is attempting to recite a Markush claim limitation because the limitation is not presented in proper Markush form. For example, a proper Markush limitation would read as, "... air openings are provided to at least one location selected from the group consisting of in the spacers and between the spacers."

Regarding claim 11, it is unclear as to the relationship between "an endothermic stage" in line 2 and the "at least one neighboring endothermic stage" set forth in claim 1, line 9.

Regarding claim 14, it is unclear as to the relationship between "a plurality of structural elements" in lines 1-2 and the "structural elements" set forth in claim 1, line 10. Furthermore, a "thin shaped structure" in line 2 is considered vague and indefinite because "thin" is a relative term, and it is unclear as to where a "thin shaped structure" is disclosed in the specification and drawings. Also, it is noted that the amendment submitted on May 20, 2004 claims a "fin shaped structure". Thus, it is unclear as to whether applicants are attempting to recite a structure that is "thin shaped" or "fin shaped". Additionally, it is unclear as to whether applicant is attempting to

recite a Markush claim limitation because the limitation is not presented in proper Markush form. For example, a proper Markush limitation would read as, "... a plurality of [the] structural elements comprise at least one structure selected from the group consisting of a [thin/fin] shaped structure, a bar shaped structure, and a U-shaped structure."

Regarding claim 16, "the reactor" (line 2) lacks proper positive antecedent basis. Also, "the outflow channel" (lines 3-4) lacks proper positive antecedent basis.

Regarding claim 18, the limitation of a "thin shaped structure" in line 2 is considered vague and indefinite because "thin" is a relative term, and it unclear as to where a "thin shaped structure" is disclosed in the specification and drawings. Also, it is noted that the amendment submitted on May 20, 2004 claims a "fin shaped structure". Thus, it is unclear as to whether applicants are attempting to recite a structure that is "thin shaped" or "fin shaped".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 2, 11 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Lennarz et al. (DE 42 02 107).

Regarding 1, 11 and 18, Lennarz et al. (FIG. 1-3; machine translation of German; Abstract) disclose an apparatus comprising at least two metal plates **1** arranged essentially parallel to each other and at a distance from each other, wherein the plates **1** form a reaction gap therebetween (i.e., flow duct **3**), and each one of the plates **1** has a surface facing the reaction

gap, the surface facing the reaction gap of at least one of the plates having a catalytic coating (i.e., a thin coating of catalytic material **2**) for the combustion of a fuel gas/oxygen mixture thereon, to generate and transfer heat directly through at least one of the plates **1** to at least one neighboring endothermic stage (i.e., flow duct **4**) formed by the surfaces of the plates **1** facing away from each other, and at least one of the plates **1** comprises structural elements (i.e., shapings **5** having a thin/fin shape; guidance ribs **6**) being covered with a catalyst coating **2**, wherein the structural elements **5,6** extend into the reaction gap **3**, and wherein the height of each of the structural elements is less than the reaction gap (best seen in FIG. 3).

Regarding claim 2, Lennarz et al. discloses the apparatus comprises a four-sided element (i.e., four sided plates **1** forming the burner element; see top view in FIG. 2), wherein the reaction gap **3** is provided with an inlet and an outlet on first and second opposite sides of the four sided element for a fuel gas/oxygen mixture (see flow arrows in FIG. 2).

Instant claims 1, 2, 11 and 18 structurally read on the apparatus of Lennarz et al.

6. Claims 1, 3 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Dalla Betta et al. (US 5,518,697).

Regarding claim 1 and 3, Dalla Betta et al. (FIG. 2, 3, 3A, 3B; Abstract; column 17, line 56 to column 18, line 48) discloses a conventionally known apparatus comprising at least two metal plates (i.e., corrugated metallic sheets **22**) arranged essentially parallel to each other and at a distance from each other, wherein the plates **22** form a reaction gap (i.e., channel **26**) therebetween, and each one of the plates **22** has a surface facing the reaction gap **26**; the surface facing the reaction gap of at least one of the plates having a catalytic coating thereon (i.e., a combustion catalyst coating **24**) to generate and transfer heat directly through at least one of the

plates to at least one neighboring endothermic stage (i.e., channel **28**), and at least one of the plates **22** comprises structural elements (i.e., as defined by the corrugations of the plates **22**) being covered with the catalyst coating **24**, the structural elements extending into the reaction gap **26**, wherein the height of each of the structural elements is less than the reaction gap **26** (see Figures), wherein the corrugated plates **22** have a wave-like shape (FIG. 2, 3), and wherein each plate comprises peaks **30** and valleys **32** extending in the flow direction.

Regarding claim 19, Dalla Betta et al. discloses that the corrugations of each plate **22** can be "triangular, sinusoidal or any other corrugated structure envisioned in the art," (column 18, lines 6-10), wherein the sinusoidal shape inherently defines a U-shaped structure. A plate **10** having a sinusoidal shape is shown in FIG. 1.

Instant claims 1, 3 and 19 structurally read on the apparatus of Dalla Betta et al.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dalla Betta et al. (US 5,518,697) in view of Sugimoto (JP 11-351514).

Dalla Betta et al. discloses that the corrugations of each plate **22** can be "triangular, sinusoidal or any other corrugated structure envisioned in the art." (column 18, lines 6-10). However, Dalla Betta et al. is silent as to the corrugations comprising, specifically, a "rectangular or square wave" shape. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select a rectangular or square wave for the corrugations of plates **22** in the apparatus of Dalla Betta et al., on the basis of suitability for the invented use, because rectangular or square wave corrugations are well known in the art, and changes in shape involves only ordinary skill in the art. *In re Dailey* 149 USPQ 47, 50 (CCPA 1966); *Glue Co. v Upton* 97 US 3, 24 (USSC 1878). Sugimoto teaches known examples of heat transfer plates having various corrugated structures, including rectangular or wave shaped corrugations (see FIG. 2-7; Abstract).

8. Claims 1, 2, 5-8, 10-12 and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tawara et al. (JP 05-155602) in view of Lennarz et al. (DE 42 02 107).

Regarding claims 1, 11, 12 and 18, Tawara et al. (embodiment of FIG. 6, 7; Abstract; Machine Translation) discloses an apparatus comprising at least two plates (i.e., septums **7**, not labeled in FIG. 6 or 7, but labeled in FIG. 5) arranged essentially parallel to each other and at a distance from each other, wherein the plates form a reaction gap therebetween (i.e., a heating chamber **12**), and each one of the plates **7** has a surface facing the reaction gap **12**, the surface facing the reaction gap of at least one of the plates having a catalytic coating thereon (i.e., a coating of combustion catalyst **2**), constructed and arranged to, as a result of a catalytic

combustion of a fuel gas/oxygen mixture (i.e., supplied via inlet **4**) on the surface having a catalyst thereon, generate heat and emit the heat by radiation, convection and conduction directly through at least one of the plates **7** to at least one neighboring endothermic stage (i.e., a reforming chamber **11**, having a coating of reforming catalyst **1**).

Tawara et al. is silent as to whether the at least two plates 7 may be formed of metal. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select a metal for the at least two plates in the apparatus of Tawara et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because it is well known in the art to form heat transfer surfaces from metal, as evidenced by Lennarz et al. In particular, Lennarz et al. teaches a heat exchanger comprising at least two parallel plates **1** being formed of metal, which allows for good adhesion of the catalytic material and ensures good heat transfer (see FIG. 1-3; Abstract; machine translation of column 1, line 57 to column 2, line 3).

Tawara et al. is further silent as to the at least two plates 7 comprising structural elements that are covered with a catalyst coating, wherein the structural elements extend into the reaction gap **12**, and wherein the height of each of the structural elements is less than the reaction gap **12**. Lennarz et al. (FIG. 1-3; Abstract; Machine Translation) teaches an apparatus comprising at least two metal plates **1** having structural elements (i.e., shapings **5** of a thin or fin shape) that extend into a reaction gap **3** defined by facing surfaces of plates **1**, wherein the height of each of the structural elements **5** is less than the reaction gap width (see FIG. 3). Additionally, a catalyst coating (i.e., a combustion catalyst **2**) is provided on the surfaces of the plates **1** and structural elements **5** (i.e., the coating is indicated by the bold line; see FIG. 3). It would have been

obvious for one of ordinary skill in the art at the time the invention was made to provide such structural elements to the at least two plates **7** in the apparatus of Tawara et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the structural elements create a larger surface area for supporting a catalyst coating, thereby enabling a complete and uniform burn of the fuel air mixture, as taught by Lennarz et al.

Regarding claim 2, Tawara et al. discloses the apparatus comprises a four-sided element (i.e., the plates **7** defining the burner elements each have four sides; see FIG. 1, 3), wherein the reaction gap **12** provides an inlet (i.e., via line **4**) and an outlet (i.e., via line **6**) on opposite sides of the four sided element for a flow of a fuel air mixture (see also FIG. 6, 7).

Regarding claim 5, Tawara et al. (FIG. 3, 6, 8) disclose a device for introducing diluting air transversely to the direction of flow (i.e., the plurality of fuel feeding pipes **8** with nozzles **9**, for feeding gas in a direction transverse to the flow direction from inlet **4** to outlet **6**) provided at least in one place along at least one of the oppositely positioned third and fourth sides of the element (i.e., provided on the front facing side of the apparatus, as illustrated in FIG. 3 and 8).

Regarding claim 6, Tawara et al. discloses the device **8, 9** introduces gas perpendicular to the flow direction of gas through the reaction gap **12** (i.e., best seen in FIG. 4, 8).

Regarding claims 7 and 8, Tawara et al. discloses the reaction gap/combustion chamber **12** being subdivided in the flow direction into several sections (i.e., four sections, as defined by the shaded regions in FIG. 8), with the device for introducing diluting air **8** having openings **9** arranged between neighboring sections.

Regarding claim 10, Tawara discloses the structural elements as shown in FIG. 10A-C define spacers (section [0014]), wherein air openings (i.e., in incorporating the fuel feed pipes **8**

and nozzles **9** of FIG. 4 into the embodiment of FIG. 10A or 10C, for example) are inherently provided therein.

Regarding claim 15, Tawara et al. discloses the inlet (i.e., fuel introduction line **4**) communicates with several feed-in passages that guide the fuel/oxygen mixture over the width of the reaction gap **12** (see FIG. 3, 8, for external inlet manifold communicating with line **4**, which feeds gas to fuel feed pipes **8**).

Regarding claim 16, Tawara discloses the outlet (i.e., discharge line **6**) communicates with several collecting passages that collect the exhaust gases from the reaction gap **12** at various places along the side (i.e., at four locations along the top side; FIG. 3), the collecting passages feeding the exhaust gas to the outflow channel (see FIG. 3, for external outlet manifold communicating with line **6**).

Regarding claim 17, Tawara et al. discloses the feeder passages (i.e., communicating with line **4**) and collecting passages (i.e., communicating with line **6**) are arranged side by side at equal distances from each other (see FIG. 3, 8), wherein the passages are inherently rectangular, as evidenced by the parallel plate 7 configuration.

9. Claims 1, 2, 11, 13, 14 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hotta (JP 62-160134) in view of Lennarz et al. (DE 42 02 107).

Regarding claims 1 and 11, Hotta (FIG. 1-3; Abstract) discloses an apparatus comprising: at least two plates (i.e., partition walls **5a**, **5b**) arranged essentially parallel to each other and at a distance from each other, wherein the plates form a reaction gap therebetween (i.e., a chamber defined by the hollow center of plate **6b**, containing a combustion catalyst **4**), and each one of the plates **5a**, **5b** having a surface facing the reaction gap, constructed and arranged to, as a result

of a catalytic combustion of a fuel gas/oxygen mixture **F/A** on the catalyst **4**, generate heat and emit the heat through at least one of the plates **5a**, **5b** to at least one neighboring endothermic stage (i.e., to a chamber defined by the hollow center of plate **6a**, containing reforming catalyst **2**), and at least one of the plates **5a**, **5b** comprises structural elements (i.e., indentations and protrusions **13**) extending into the reaction gap, wherein the height of each of the structural elements **13** is less than the reaction gap (see figures).

Hotta is silent as to whether the at least two plates **5a**, **5b** may be formed of metal. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select a metal for the at least two plates in the apparatus of Hotta, on the basis of suitability for the intended use, because it is well known in the art to form heat transfer surfaces from metal material, as evidenced by Lennarz et al. In particular, Lennarz et al. teaches a heat exchanger comprising at least two parallel plates **1** being formed of metal, which allows for good adhesion of the catalytic material and ensures good heat transfer (see FIG. 1-3; Abstract; machine translation of column 1, line 57 to column 2, line 3).

Hotta is further silent as to the catalyst **4** being coated onto the surfaces of the at least one plate **5a**,**5b** and the structural elements **13**. Instead, the catalyst **4** is filled in the hollow chamber defined by plate **6b**. Lennarz et al. (FIG. 1-3; Abstract; Machine Translation) teaches an apparatus comprising at least two metal plates **1** having structural elements (i.e., shapings **5**; guidance ribs **6**) thereon and forming a reaction gap therebetween (i.e., flow duct **3**), wherein the surfaces of plates **1** and the structural elements **5**,**6** have a catalytic coating thereon (i.e., a thin coat of catalytic material **2**). It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide the catalyst **4** as a catalyst coating on the surfaces of

plates **5a**, **5b** and the structural elements **13** in the apparatus of Hotta, on the basis of suitability for the intended use, because a thin coating of catalyst allows for a flameless combustion of a fuel air mixture at ambient temperature, and the coating of both the surfaces of the plates and the structural elements with the catalyst maximizes the surface area of the catalyst, thereby enabling a complete and uniform burn of the fuel air mixture, as taught by Lennarz et al. (see machine translation).

Regarding claims 2 and 13, Hotta discloses the apparatus comprises a four-sided element (i.e., the plates **5a**, **5b** forming the burner element are four-sided; see FIG. 1, 2), wherein the reaction gap, containing catalyst **4**, is provided with an inlet (i.e., communicating with channels **8**, **9** for fuel **F**, air **A**) and an outlet (i.e., communicating with channel **10**, for exhaust gas; see FIG. 1, 2) on opposite sides of the four sided element, wherein the feed channel **8,9** is arranged in an edge region on a first side of the element (see FIG. 2), extending perpendicular to the reaction gap (see FIG. 1).

Regarding claims 14 and 18, Hotta discloses a plurality of the structural elements **13** (see FIG. 2), wherein the elements have a thin/fin shaped structure (see FIG. 3).

Response to Arguments

10. Applicant's arguments with respect to claims 1-8 and 10-19 have been considered but are moot in view of the new ground(s) of rejection, necessitated by amendment.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer A. Leung
April 14, 2005

Hien Tran

HIEN TRAN
PRIMARY EXAMINER